Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection

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May 3, 2017

Ms. Carly Filler
Rutland AD 1 LLC
20 Walnut Street
Wellesley, MA 02481

RE: Rutland
Transmittal No.: X274161-A1
Application No.: CE-17-013
Class: *SM-25*
FMF No.: 511728
AMENDED AIR QUALITY PLAN APPROVAL

Dear Ms. Filler:

The Massachusetts Department of Environmental Protection ("MassDEP"), Bureau of Air and Waste, has reviewed your Limited Plan Application ("Application") listed above. This Application concerns the proposed modification of the existing feedstock tank into a hydrolyzer tank at your Jordan Farms Organic Recyclery located at 51 Muschopauge Road in Rutland, Massachusetts ("Facility").

This Application was submitted in accordance with 310 CMR 7.02 Plan Approval and Emission Limitations as contained in 310 CMR 7.00 "Air Pollution Control" regulations adopted by MassDEP pursuant to the authority granted by Massachusetts General Laws, Chapter 111, Section 142 A-O, Chapter 21C, Section 4 and 6, and Chapter 21E, Section 6. MassDEP's review of your Application has been limited to air pollution control regulation compliance and does not relieve you of the obligation to comply with any other regulatory requirements.

MassDEP has determined that the Application is administratively and technically complete and that the Application is in conformance with the Air Pollution Control regulations and current air pollution control engineering practice, and hereby grants this **Plan Approval** for said Application, as submitted, subject to the conditions listed below. **This Plan Approval supersedes Plan Approval Transmittal Numbers X269335 issued December 12, 2016 and X274161 issued on March 23, 2017 in their entirety.** The underlying plan application materials of preceding approvals remain in effect where not superseded by this Plan Approval.

Please review the entire Plan Approval, as it stipulates the conditions with which the Facility owner/operator ("Permittee") must comply in order for the Facility to be operated in compliance with this Plan Approval.

1. DESCRIPTION OF FACILITY AND APPLICATION

A. HISTORY AND DESCRIPTION OF OPERATIONS

The Facility is located within the footprint of Jordan Dairy Farms in Rutland, Massachusetts. The farm produces raw milk for wholesale distribution to cooperative processing facilities. The farm has approximately 500 cows. The farm also includes 218 acres of land for corn and 300 acres for hay crops. The Facility combines the in-house cow manure with leftover food and other Source Separated Organic (SSO) materials received from offsite to produce biogas in an anaerobic digestion system. The Permittee has purchased the anaerobic digestion system, which was designed and built by the Quasar Energy Group, and is now operated and maintained by Rutland AD 1 LLC Vanguard Operations or one of its contractors.

The anaerobic digestion/biogas-to-energy system (AD system) currently consists of one feedstock tank (Emission Unit (EU)4), one digester tank (EU5), a dewatering system, and one tank (EU6) used for storing the liquid effluent. Cow manure from Jordan Farms is stored in Jordan Farm's manure lagoon and manure pit, outside the scope of the Facility, and then is pumped directly to EU5. The biogas produced in the AD system is about 60% methane by volume and has a heating value of approximately 607 British thermal units (Btu) per standard cubic foot. The biogas is used to produce electricity and heat via the 500 kilowatt (kw) biogas-fired combined heat and power engine/generator set (EU1) or is combusted via the back-up utility flare (EU2) when either excess biogas is produced or the engine/generator set is offline for maintenance or service. Heat and some of the electricity are used by Jordan Dairy Farms while the remaining unused electricity is provided to the electric grid.

On August 28, 2010, MassDEP issued Plan Approval MBR-10-COM-00 for the construction of the Facility including the first engine rated at 300 kilowatts. On May 22, 2014 MassDEP issued Plan Approval NE-13-017 for a replacement engine rated at 500 kilowatts. On May 12, 2016, MassDEP issued a Recycling, Composting or Conversion (RCC) Permit Transmittal No. X267924 for expanded operations at the Facility, including receiving and processing larger amounts of SSO. Under the RCC Permit, the Facility had a maximum combined manure and SSO acceptance rate of 125 tons per day and a total annual tonnage of 45,625 tons.

On November 4, 2016, MassDEP and the Permittee entered into ACOP-CE-16-7003-NT to resolve violations of the Air Pollution Control Regulations at the Facility.

On December 12, 2016, MassDEP issued Non-Major Comprehensive Plan Approval Transmittal No. X269335. This Plan Approval was for the installation of a second engine and other changes at the Facility which consisted of the following:

1. In accordance with the RCC Permit Transmittal No. X267924, changing operations to accept off-site unpackaged solid food byproducts in addition to the already accepted off-site liquid food

byproduct and to increase the combined manure and SSO acceptance rate from 100 tons per day to 125 tons per day maximum.

2. Adding an 18,000 gallon solids reception tank, a 30,000 gallon liquids tank, and a 10,000 gallon glycerin tank, with a new odor control system (biofilter) to treat all of these. These tanks and the biofilter will collectively be designated EU8.

3. Decommissioning the previous single 10,000 gallon receiving tank for liquid SSO (EU3) and its associated carbon filter odor control system.

4. Adding a new 300 kW engine to make use of the expected increased biogas from the increased SSO acceptance. This engine will be designated EU7.

5. Installing an oxidation catalyst for reduction of carbon monoxide (CO) and compounds (VOC) on both the existing 500 kW engine and the new 300 kW engine.

6. Installing upgraded noise controls on both the existing 500 kW engine and the new 300 kW engine, and other noise mitigation measures throughout the Facility.

On February 21, 2017, MassDEP Division of Solid Waste approved a request from the Permittee to increase the maximum combined manure and SSO acceptance rate to 375 tons per day. The increase to a maximum of 375 tons per day is for the purpose of filling up the Facility existing and new SSO storage tanks in order to carry the Facility through periods when no SSO is received for several days. The Facility annual tonnage limit remains at 45,625 tons.

B. PROJECT DESCRIPTION

On March 13, 2017, MassDEP received the present application Transmittal No. X274161. This application requests the following:

1. Change the description of EU4 from being a feedstock tank to being a hydrolyzer tank.
2. Disconnect the EU4 headspace air from the EU5 digester headspace, and direct exhaust air from EU4 to a new activated carbon media treatment system.
3. Add entries to Tables 1, 3, 4 and 6 regarding the new activated carbon treatment system.

MassDEP approves the requested changes and is revising the Plan Approval accordingly. The following Description of Modified Operations has been revised to reflect the changes requested in Plan Application Transmittal No. X274161.

C. DESCRIPTION OF MODIFIED OPERATIONS

As proposed under the Applications Tr. No. X269335 and Tr. No. X274161, the Facility will operate the following emission units and systems.

New SSO Receiving Area Tankage (EU8) and Biofilter

The Facility is decommissioning its previous single receiving tank for liquid SSO (EU3) and is adding a 18,000 gallon solids and semisolids tank, a 30,000 gallon liquids-only tank, and a 10,000 gallon glycerin tank, with a new odor control system (biofilter) to treat all of these. These tanks will collectively be designated EU8. Liquid SSO derived feedstock is delivered to the Facility via tanker trucks with maximum capacities of 9,000 gallons each. The liquid SSO is pumped from the truck into the tanks. Solids will be delivered to the solids tank in roll-off container trucks, which will dump their contents into the pit. The solids pit will contain a chopper pump to macerate solids materials and a mixer to homogenize materials. Liquid digestate will be added to the solids as needed to make them pumpable.

The potential for odor exists when the tanks are being filled. This is primarily due to the presence of hydrogen sulfide (H_2S) gas in the headspace which is displaced during tank filling. The tanks will be controlled for odor using a biofilter which is expected to reduce odors by approximately 90% when maintained as designed. A heavy duty blower routed to a biofilter will be used to create negative air pressure in the headspace of the tanks. The biofilter will be a custom 8 yard capacity metal biofilter container with a steel cover. The air will be dispersed throughout the biofilter using an air-distribution grid made of perforated PVC piping. The biofilter will be filled with 1.5 cubic yards of media material, composed of 50% peat moss, 50% wood chips with a bed depth of 24 inches.

The biofilter is designed for a minimum empty bed contact time of 10 seconds while the hatch is open, sufficient for adequate removal of odors from covered manure storage units[1]. When delivering a load, the driver or operator will activate either manual or remote controls to ramp the flow rate of the blower up to approximately 300 cubic feet per minute (cfm). The fan will run for five (5) minutes before the hatch is opened. Once the load has been added, the driver and/or operator will again activate manual or remote controls to close the lid. The blower will continue at high speed for five (5) minutes after the hatch is closed. Thereafter, the blower will be operated at a lower rate of approximately 100 cfm. The hatch will be opened approximately three times per day for 5 minutes or less each time during solid SSO delivery.

The biofilter will be fitted with a pressure transducer and a moisture sensor. The media compacts over time and has the potential to clog, causing the differential pressure across the

[1] Schmidt, D; Jacobson, L; Nicolai, R. "Biofilter Design Information." *Manure Management and Air Quality.* University of Minnesota Extension, published March 2004, accessed May 17, 2016. http://www.extension.umn.edu/agriculture/manure-management-and-air-quality/air-quality/biofilter-design-information/.

media to rise. The biofilter media will be manually irrigated using a hose. A fully automated irrigation system may be installed in the future. Both the moisture sensor and the differential pressure sensor will initiate a notification to the operator via a mobile device if a reading is out of a set range. The acceptable pressure and moisture ranges will be established in the facility's Standard Operation and Maintenance Procedure (SOMP). The operator will monitor and record the differential pressure and moisture level weekly, either manually or via the mobile device, to determine the need for media amendment or replacement. The operator will also perform a weekly "sniff test" to check for possible channeling of biogas through the biofilter media.

Biofilter media will be replaced when the rise in pressure drop reduces the ventilation rate. Typically this occurs every 2-5 years. Operators will keep a log of media replacement.

Hydrolyzer Tank (EU4)

In addition to deliveries to EU8, liquid SSO can be delivered from tanker trucks into the existing 50,000 gallon Feedstock Tank, which will be reconfigured as a Hydrolyzer Tank, designated as Emission Unit 4 (EU4).

EU4 is a 50,000 gallon capacity, insulated, bolted steel tank approximately 16 feet in diameter. A side-entry prop mixer is utilized to prevent the stratification of its contents and to ensure a consistent mix for feeding to the digester tank EU5 (see below). Material from EU8 will be fed to the hydrolyzer (EU4) to begin hydrolysis (material breakdown) before being fed into the digester tank (EU5).

The pipe connecting the headspace from EU4 with EU5 will be removed so the headspace of the two tanks remains separate. Odorous gasses within the headspace of the hydrolyzer will first move through a moisture removal element prior to entering a dedicated carbon filter. After the moisture separation, the displaced air will be blown through a Pelletized Activated Carbon (PAC) Media impregnated with potassium hydroxide for the desulphurization of gases and the removal of acidic contaminants such as hydrogen sulfide (H2S), hydrogen chloride, and mercaptans. EU4 has a gas tight steel roof and a safety PRV, after disconnecting the headspace from EU5 an "air inlet" valve will be installed in the tank in order to compensate for vacuum conditions during normal operations tank volume changes. This valve will only let air into the tank and will not let any headspace gas be released to the atmosphere.

A breakthrough curve will be established for the PAC Media, which is expected to last about 12 months, unless sniff tests or sorbent tube readings indicate that the material is no longer effective and needs replacing before this time interval.

The carbon vessel (or ductwork) will have sample ports that allow both "sniff tests" and monitoring of hydrogen sulfide as a surrogate for odor. These ports will be measured weekly during the first carbon cycle for odor via "sniffing" and via sorbent tubes or a handheld gas analyzer. As the system approaches breakthrough, the carbon change-out will be scheduled. Once the first carbon breakthrough has been determined, the second carbon cycle can be limited

to sniff tests for the first 50% of the expected life cycle. Thereafter, the weekly monitoring can be limited to sniff tests for the first 75% of the expected life cycle. Enough replacement media for one replacement will always be kept on site.

Digester Tank (EU5)

The SSO from EU4 and EU8 and the cow manure from the existing cow manure storage pit (which is outside of the scope of the Facility) are introduced separately into the existing 500,000 gallon Digester Tank (EU5), where they are mixed together and heated to an optimum temperature.

EU5 provides a mean hydraulic retention time of approximately 33 days, which is necessary to allow methanogenic bacteria to convert approximately 48% of the organic biomass into biogas. The material in EU5 is heated to maintain an ideal temperature of approximately 100 degrees Fahrenheit ($^{\circ}$F). The actual EU5 temperature is maintained in the range of 90 - 105 $^{\circ}$F via a heat exchanger using waste heat from the engine/generators for optimal digestion.

EU5 is a 60 foot diameter, insulated, bolted, steel tank 30 feet tall with a working volume of 500,000 gallons. Side-entry prop mixers are used to prevent stratification of any material inside EU5, ensuring a consistent mix. The conditioned biomass from EU4 is fed into EU5 at a turbulence zone created by the mixer to minimize the time required to obtain a complete mix.

Biogas storage in EU5 occurs within the single membrane roof system that inflates and deflates according to the amount of biogas therein. Safe pressure levels are maintained by a water trap mounted to EU5 that allows gas to automatically release if the gas pressure is higher than 2.5 inches water column or lower than -2.5 inches water column negative pressure. Through the SCADA system, an audible and visual alarm will go off if the digester experiances over- or under-pressure events. There is no alarm specific to the use of the pressure relief valve, but since the system will alarm when there are high pressure conditions, the operators will know to inspect the pressure relief valve to see if it is in use.

During the initial commissioning of the AD system prior to commencement of biogas production, the membrane was supported by a column and cable system to keep it from contacting the biomass. This system also supports a net which provides a surface area for the colonization of natural aerobic bacteria to convert hydrogen sulfide (H_2S) in the biogas to elemental sulfur and sulfates. To support the process of biologically oxidizing H_2S with aerobic bacteria, small amounts of air are dosed into the headspace of EU5. The dosage rate is controlled by the amount of oxygen measured in the cleaned biogas so that it is maintained between 0.2 and 1% by volume.

Hydrogen sulfide levels entering the combined heat and power (CHP) engines will be continuously monitored and recorded by a SCADA system. When the H_2S concentration reaches a pre-determined level, ferric chloride or ferric hydroxide will be added to the anaerobic digester

at the correct dosage to convert the hydrogen sulfide to ferric sulfide which is precipitated into the digestate.

Effluent Management System

Partially digested hay material solids are separated from the liquid effluent from EU5 and this hay material can be used in the maternity barns for bedding. All liquid effluent is stored on-site in the 1,000,000 gallon liquid fertilizer storage tank (EU6). This material is used as a fertilizer at Jordan Dairy Farms and other local farms. This liquid fertilizer has a reduced odor potential in comparison with the previous practice of using raw cow manure from the open lagoon via direct land application in the spring and fall.

Existing and New Combined Heat and Power Sets (EU1 and EU7)

Biogas from EU5 serves as fuel for the existing Dresser-Rand Guascor HGM 240, IC-G-B-24-112 engine (EU1), and the new Guascor Model No. SFGLD, IC-G-B-074 engine (EU7). The existing shrouded back-up utility flare (EU2) combusts the biogas whenever necessary as described below.

EU1 has a maximum heat input capacity of 4,450,000 British thermal units per hour (Btu/hr). This engine combusts up to 122 standard cubic feet per minute (scfm) of digester gas at 100% load, though it usually operates at less than 100% capacity. EU1 recovers heat from the engine jacket water in heat exchangers used to heat process streams.

This existing engine will be retrofitted with a DCL America carbon monoxide catalyst (or equivalent) to reduce carbon monoxide emissions by 95% and reduce formaldehyde emissions by 85%. Catalyst blinding may be caused by the presence of siloxanes in the biogas. The catalyst will be checked for efficiency on a quarterly basis using an E Instruments model E1500 (or equivalent) hand-held combustion gas analyzer. In addition, the backpressure across the engine system will be monitored daily. If elevated pressures are traced back to the catalyst, the catalyst will be checked for control efficiency and will be replaced as necessary.

The existing engine (EU1) will remain in its current enclosure. The engine will be retrofitted with a Super Extreme Grade Silencer manufactured by GT Exhaust (or equivalent) to reduce exhaust sound levels. The EU1 engine enclosure will have acoustically-treated outlet exhaust louvers installed for additional sound mitigation.

EU7 has a maximum heat input capacity of 2,930,000 Btu/hr. This engine combusts up to 81 scfm of digester gas at 100% load, though it will usually operate at less than 100% capacity. EU7 will have a heat exchanger to extract process heat from the engine exhaust gas.

This engine will include a DCL America carbon monoxide catalyst (or equivalent) to reduce carbon monoxide emissions by 95% and reduce formaldehyde emissions by 85%. The catalyst

will be checked for efficiency in the same manner as the existing engine (EU1) and will be replaced as necessary.

The new CHP engine (EU7) will be delivered in a prefabricated acoustically-treated enclosure which will have acoustically-treated inlet and outlet exhaust louvers. The engine will have a Super Extreme Grade Silencer manufactured by GT Exhaust (or equivalent) to reduce exhaust sound levels. The engine installation will include acoustical enclosures for the radiator fans which minimize sound propagating off the Facility property.

Existing Back-up Utility Flare (EU2)

The existing shrouded utility flare, or EU2, has a maximum heat input capacity of 7,300,000 Btu/hr. This back-up flare is capable of combusting up to 200 scfm of digester gas, which is the expected maximum rate of biogas production, and has a turndown ratio of 3:1. The flare will be used during start-up, down-time, and maintenance of the engines. It will also be used to reduce digester pressure in the event that the engines cannot burn all the biogas being produced and biogas cannot be temporarily stored in the digester membrane. The pressure within the anaerobic digester will be monitored and at specific set points (to be determined in the Standard Operating and Maintenance Procedure (SOMP)) the flare blower will start and the flare will ignite. Biogas will ideally be routed to the engines, so it is expected that the flare will be used to combust no more than 15,768,000 cubic feet biogas per twelve-month rolling period.

When the flare is called to ignite and burn off excess biogas (identified by biogas pressure in the digester and through the SCADA control system), the starting process requires that the blower turns on and proves to a pressure transducer that the blower is running, then the gas valve opens and the ignition coil sparks and the flame detector senses that the flame has been made. At this point, operations are enabled and the flare continues to burn biogas until the biogas pressure in the digester is reduced and the signal for stopping the flare is initiated, at which point the blower is turned off, the valve is closed, and the flame dies out. If the system detects that there is no flame present when biogas is being routed to the flare, the gas valve will be closed and no more biogas will be sent to the flare.

SCADA System

The Supervisory Control and Data Acquisition (SCADA) system monitors process control parameters such as digester temperature, digester gas biogas pressure, mixer on/off, pumps, control of heating zones in heat exchanger, and output generation from the engine/generator set. It will be capable of controlling all system functions by operators that can remotely access the SCADA system via the internet. The SCADA system as well as the process tanks, effluent management system, and biogas processing equipment (i.e., engine, shrouded flare) will be serviced by local technicians in the area.

As part of the SCADA system, the methane, oxygen (O_2), and H_2S content of biogas exiting EU5 will be continuously monitored by a LandTec GA3000 fixed gas analyzer.

D. APPLICABLE REGULATORY REQUIREMENTS

State Requirements

a) BACT

310 CMR 7.02(8) requires Best Available Control Technology (BACT) for Plan Approvals. The anaerobic digester system, CHP generator sets, and associated gas back-up flare will operate in accordance with MassDEP guidance entitled *Top Case Best Available Control Technology (BACT) Guidance for air emissions from digester-gas-to-electricity operations at Massachusetts farms* (dated February 24, 2016) as reflected in Table 2, Operational, Production, and Emission Limitations. The hydrogen sulfide emission limits will be achieved through use of the aerobic mesh in the digester gas headspace, and adding iron compound reagents to the mixed liquid of the digester as necessary. The carbon monoxide and formaldehyde emission limits will be achieved by using catalytic oxidizers on each engine.

b) Greenhouse Gas Reporting

The Permittee is subject to 310 CMR 7.71, Reporting of Greenhouse Gas Emissions, including those from biogenic sources.

c) Air Dispersion Modeling

310 CMR 7.02(3)(j)1 requires that the emissions from a facility do not result in air quality exceeding either the Massachusetts or the National Ambient Air Quality Standards. The Permittee did ambient air dispersion modeling to show compliance with these standards.

This section documents the results from an ambient air quality dispersion modeling analysis for the Jordan Farms anaerobic digester (AD) biogas-to-energy combustion equipment to demonstrate that the predicted air quality impacts will comply with the Massachusetts and National Ambient Air Quality Standards (NAAQS) and Massachusetts Ambient Air Toxic Guidelines 24-hr Threshold Effects Exposure Limit (TEL) and the annual Allowable Ambient Limit (AAL) for formaldehyde. The air quality analysis was reviewed by MassDEP.

The air quality impact analysis was based on the existing 500 kW CHP engine, new 300 kW CHP engine, and back-up flare operating simultaneously at 100% of their load. This is a conservative operational scenario as the flare will typically be employed only when no engines or one engine is operating. The air dispersion model predicted maximum concentrations of carbon monoxide, nitrogen dioxide, particulate matter less than or equal to 2.5 microns in diameter, particulate matter less than or equal to 10 microns in diameter, and sulfur dioxide, along with formaldehyde, in the area surrounding the farm. These predicted concentrations, except for formaldehyde, were then added to representative background concentrations and

compared to the NAAQS. Model-predicted concentrations of formaldehyde at the nearest occupied dwelling are compared directly to the TEL/AAL.

No nearby facilities with significant emissions of criteria pollutants are located in the area directly surrounding the farm in Rutland, so it was not necessary in include any off-site sources in the modeling analysis.

Type of Model

The air quality modeling analysis was performed with the latest version (15181) of the United States Environmental Protection Agency (USEPA) AERMOD dispersion model with USEPA's recommended regulatory default options and rural dispersion coefficients. The modeling was run using a meteorological data-set derived from utilizing AERMET (14134) with default options. Terrain elevations for receptors and structures were obtained from the USGS National Elevation Dataset (NED) and processed using the AERMAP preprocessor.

Modeling Results

The following table presents the modeling results submitted in support of the Plan Approval Application. These results are compliant with the criteria pollutant NAAQS and formaldehyde TEL/AAL. Except where noted, the total impact represents the combined maximum model-predicted concentrations from the two engines and flare at Jordan Farms plus background levels. This analysis demonstrates that the Jordan Farms anaerobic AD biogas-to-energy combustion equipment will neither cause nor contribute to a condition of air pollution with respect to its criteria pollutant and formaldehyde emissions.

Table A - Air Dispersion Modeling Results – Jordan Farms

Pollutant	Averaging Period	Total Impact [1] ($\mu g/m^3$)	NAAQS or TEL/AAL ($\mu g/m^3$)
NO_2	1-hr	95.8	188
	Annual	8.9	100
SO_2	1-hr	126.6	196
PM_{10}	24-hr	26.3	150
$PM_{2.5}$	24-hr	22.9	35
	Annual	8.0	12
CO	1-hr	3035	40,000
	8-hr	1984	10,000
Formaldehyde	24-hr	1.54	2.0 (TEL)
	Annual	0.03	0.08 (AAL)

Table A Key:

AAL = Allowable Ambient Limit
CO = Carbon Monoxide
hr = hour
PM = Total Particulate Matter
$PM_{2.5}$ = Particulate Matter less than or equal to 2.5 microns in diameter
PM_{10} = Particulate Matter less than or equal to 10 microns in diameter
TEL = Threshold Effects Exposure Limit
NAAQS = National Ambient Air Quality Standards
NO_2 = Nitrogen Dioxides
SO_2 = Sulfur Dioxide
$\mu g/m^3$ = micrograms per cubic meter

Table A Note:

Note 1: Total impact equals modeled-predicted concentrations plus measured background concentrations, except for formaldehyde.

Conclusion

The inputs and results of the Jordan Farms modeling analysis were reviewed and cross-checked by MassDEP and determined to be accurate with respect to the data supporting the air permit application. Furthermore, the modeling analysis is representative of the facility in its proposed configuration and setting. MassDEP concludes that the results summarized in the AERMOD analysis indicate that all pollutants for all averaging periods modeled demonstrate compliance with NAAQS and demonstrate compliance with the formaldehyde TEL/AALs.

d) Sound Monitoring and Modeling Study

Operation of the proposed Facility will cause sound emissions that may cause noise. The Application described the following proposed sound-emitting equipment and associated sound suppression and sound transmission prevention features:

The Permittee will install the following noise mitigation equipment:

1. Enclosures or sound reflectors on the three digester mixers, and the two membrane roof pressure fans.
2. Acoustically-treated outlet exhaust louvers on the EU1 engine enclosure.
3. Exhaust silencers on the EU1 and 7 engine exhausts.

The Permittee conducted background sound level monitoring and established ambient sound levels at locations of interest based on these measurements and MassDEP guidance. The Permittee then calculated or modeled predicted sound impacts from measured ambient sound levels and project sound emissions.

Based on review of the engineering design of the Facility including sound mitigation measures and predicted facility sound level impacts, MassDEP has determined that the design incorporates

sound suppression and sound transmission prevention elements that constitute necessary equipment, service and maintenance, and other necessary precautions to prevent unnecessary sound emissions, as required by 310 CMR 7.10.

After the approved project commences operation, the Permittee shall conduct a sound survey (Table 3, Condition 26). The sound survey shall be performed in accordance with a protocol reviewed and approved by MassDEP in accordance with Table 5 condition 5.

Federal Requirements

The Permittee has stated that the Facility may be subject to 40 CFR Part 63, Subpart ZZZZ, the National Emission Standard for Hazardous Air Pollutants (NESHAP) for Stationary Reciprocating Internal Combustion Engines and 40 CFR Part 60, Subpart JJJJ, Standards of Performance for Stationary Spark Ignition Internal Combustion Engines. Since MassDEP has not accepted delegation for Subpart JJJJ and Subpart ZZZZ for sources which are not subject to 310 CMR Appendix C, the Permittee is advised to consult with EPA Region 1 at 5 Post Office Square, Suite 100, Boston, MA 02109-3912, telephone: (617)918-1111. Other applicable requirements may include notification, record keeping, and reporting requirements.

2. EMISSION UNIT IDENTIFICATION

Each Emission Unit ("EU") identified in Table 1 is subject to and regulated by this Plan Approval:

Table 1

EU	Description	Design Capacity	Pollution Control Device (PCD)
1	Guascor Model No. HGM 240, IC-G-B-24-112 engine	4.45 MMBtu/hr 500 kilowatts max output	CO control [1]: • DCL America, Inc. MQL DC68-16 CC oxidation catalyst Noise: • GT Exhaust Systems, Inc. extreme grade silencer [1]; • Acoustical enclosure
2	Back-up shrouded utility flare	7.3 MMBtu/hr	None
3	Receiving Tank (Decommissioned)	10,000 gallons	Not Applicable

Table 1			
EU	**Description**	**Design Capacity**	**Pollution Control Device (PCD)**
4	Hydrolyzer Tank	50,000 gallons	H_2S Control: • Pelletized activated carbon media treatment system • Removes H2S, mercaptans from headspace air in EU • Ferric chloride or ferric hydroxide addition, as necessary
5	Digester Tank	500,000 gallons	H_2S Control: • Air injection to support microbes on aerobic mesh in headspace of EU • Ferric chloride or ferric hydroxide addition, as necessary
6	Liquid Fertilizer Storage Tank	1,000,000 gallons	None
7 [2]	Guascor Model No. SFGLD engine	2.93 MMBtu/hr 300 kilowatts max output	CO control: • DCL America, Inc. MQL DC68-16 CC oxidation catalyst Noise: • GT Exhaust Systems, Inc. extreme grade silencer; • Acoustical enclosure
8	Receiving Area tankage	a. Solids Receiving – 18,000 gallons b. Glycerin Receiving – 10,000 gallons c. Liquids Receiving – 30,000 gallons	Container-style Biofilter

Table 1 Key:

EU = Emission Unit Number
MMBtu/hr = Million British thermal units per hour
H_2S = Hydrogen Sulfide
PCD = Pollution Control Device
CO = Carbon Monoxide

Table 1 Notes:

1. The Permittee will install the CO catalyst and upgrade the engine silencer on EU1 within 30 days of continuous operation of EU7.
2. It will take 12-15 months for EU7 to be interconnected to the electrical grid.

3. APPLICABLE REQUIREMENTS

A. OPERATIONAL, PRODUCTION and EMISSION LIMITS

The Permittee is subject to, and shall not exceed the Operational, Production, and Emission Limits as contained in Table 2:

Table 2

EU	Operational / Production Limit	Air Contaminant	Emission Limit[3]
EU1[1, 2]	Nominal rated electrical power output ≤ 500 kW	NO_x	0.6 g/bhp-hr 0.92 lb/hr 4.04 TPY 0.67 TPM
		CO [4]	0.13 g/bhp-hr 0.19 lb/hr 0.84 TPY 0.14 TPM Designed to meet 95% carbon monoxide control efficiency using an oxidation catalyst
		VOC [5]	0.7 g/bhp-hr 1.08 lb/hr 4.7 TPY 0.78 TPM
		$PM/PM_{10}/PM_{2.5}$	0.091 g/bhp-hr 0.14 lb/hr 0.62 TPY 0.10 TPM
		SO_2	0.17 g/bhp-hr 0.25 lb/hr 1.09 TPY 0.18 TPM Daily average concentration of H_2S shall be less than or equal to 200 ppm_v entering the CHP engine

Table 2			
EU	**Operational / Production Limit**	**Air Contaminant**	**Emission Limit[3]**
		HAP $_{single}$ formaldehyde [6]	0.024 g/bhp-hr 0.035 lb/hr 0.15 TPY 0.02 TPM Designed to meet 85% formaldehyde control efficiency using an oxidation catalyst
		Opacity	≤5%, except 5 to ≤10% for ≤2 minutes during any one hour
		Smoke	310 CMR 7.06(1)(a)
EU2	Maximum volume of 15,768,000 cubic feet of biogas per twelve month consecutive period	NO_x	0.53 lb/hr 0.11 TPM 0.33 TPY
		CO	2.3 lbs/hr 0.50 TPM 1.5 TPY
		VOC	1.0 lb/hr 0.23 TPM 0.68 TPY Designed to meet 98% hydrocarbon destruction efficiency
		$PM/PM_{10}/PM_{2.5}$	0.07 lb/hr 0.02 TPM 0.05 TPY
		SO_2 [2]	0.4 lb/hr 0.09 TPM 0.27 TPY Daily average concentration of H_2S shall be less than or equal to 200 ppm_v entering the back-up flare.
		Opacity	≤5%, except 5 to ≤10% for ≤2 minutes during any one hour
		Smoke	310 CMR 7.06(1)(a)
EU7 [1, 2]	Nominal rated electrical power output ≤ 300 kW	NO_x	0.6 g/bhp-hr 0.59 lb/hr 0.43 TPM 2.60 TPY
		CO	0.13 g/bhp-hr 0.12 lb/hr 0.09 TPM 0.54 TPY Designed to meet 95% carbon monoxide control efficiency using an oxidation catalyst

Table 2			
EU	**Operational / Production Limit**	**Air Contaminant**	**Emission Limit[3]**
EU7 [1, 2]		VOC [5]	0.69 g/bhp-hr 0.69 lb/hr 0.05 TPM 3.0 TPY
		$PM/PM_{10}/PM_{2.5}$	0.09 g/bhp-hr 0.09 lb/hr 0.07 TPM 0.40 TPY
		SO_2	0.16 g/bhp-hr 0.16 lb/hr 0.12 TPM 0.72 TPY Daily average concentration of H_2S shall be less than or equal to 200 ppm_v entering the CHP engine
		HAP_{single} (formaldehyde)	0.024 g/bhp-hr 0.023 lb/hr 0.02 TPM 0.10 TPY Designed to meet 85% formaldehyde control efficiency using an oxidation catalyst
		Opacity	≤5%, except 5 to ≤10% for ≤2 minutes during any one hour
		Smoke	310 CMR 7.06(1)(a)
Facility-wide [4, 7]		NO_x	1.2 TPM 7.0 TPY
		CO [4]	0.7 TPM 2.9 TPY
		VOC [5]	1.1 TPM 8.4 TPY
		$PM/PM_{10}/PM_{2.5}$	0.2 TPM 1.1 TPY
		SO_2	0.4 TPM 2.1 TPY
		HAP_{single} formaldehyde [6]	0.04 TPM 0.25 TPY

Table 2 Key:

kW = Kilowatts
EU = Emission Unit
NO_x = Nitrogen Oxides
CO = Carbon Monoxide
CHP = Combined Heat and Power
g/bhp-hr = grams per brake-horse-power hour
lb/hr = pounds per hour
TPM = tons per month

SO_2 = Sulfur Dioxide
% = percent
≤ = less than or equal to
H_2S = Hydrogen Sulfide
lb/MMBtu = pounds per million British thermal units
PM = Total Particulate Matter, including filterable PM and condensable PM
$PM_{2.5}$ = Particulate Matter less than or equal to 2.5 microns in diameter
TPY = tons per consecutive12-month period
VOC = Volatile Organic Compounds
ppmv = parts per million by volume
HAP (single) = single Hazardous Air Pollutant (formaldehyde)
CMR = Code of Massachusetts Regulations
PM_{10} = Particulate Matter less than or equal to 10 microns in diameter

Table 2 Notes:

1. These emission limitations shall apply to all engine/generator loads. Compliance with these emission limitations shall be determined based on one-hour averages with the exception of SO_2 which shall be averaged over 24 hours. Emission limits are based upon biogas containing 607 British thermal units per standard cubic foot.
2. SO_2 emissions are conservatively based upon complete oxidation of the inlet H_2S concentrations.
3. Emission limits are calculated based on biogas containing 60% methane.
4. EU1 and Facility-wide CO emission limits established in Plan Approval Transmittal No. X256969 shall apply until the CO oxidation catalyst has been installed on EU1. Refer to Table 6, Condition 5.
5. Emissions of formaldehyde shall not be included when calculating emissions of VOC.
6. The formaldehyde emission limits will apply once the CO oxidation catalyst has been installed on EU1.
7. Facility-wide total emissions are based on the engines (EU1 and 7) running unrestricted hours (8760 hours per year), the flare (EU2) restricted to combusting 15,768,000 cubic feet of biogas per year, and less than or equal to 125 tons per day of combined SSO and manure (rolling average) to the digester.

B. COMPLIANCE DEMONSTRATION

The Permittee is subject to, and shall comply with, the monitoring, testing, record keeping, and reporting requirements as contained in Tables 3, 4, and 5:

Table 3

EU	Monitoring and Testing Requirements
1 and 7	1. The Permittee shall conduct emissions testing for NO_x, CO, VOC, total PM (Methods 5 and 202), SO_2, and formaldehyde within 90 days of the commencement of continuous operation of EU7. All compliance testing shall be conducted using the test methods and procedures detailed in 40 CFR §60.4244 and 40 CFR Part 60 Appendix A. All compliance testing shall be scheduled with MassDEP personnel at a mutually agreeable date and time.
	2. In accordance with 310 CMR 7.13 and 40 CFR 60.4243(b)(2)(ii), the Permittee shall conduct subsequent performance testing every 8,760 hours or 3 years, whichever comes first.

Table 3

EU	Monitoring and Testing Requirements
1 and 7	3. For compliance testing purposes, the Permittee shall construct EU1 and EU7 so as to accommodate the emissions testing requirements of 310 CMR 7.13 and procedures of 40 CFR Part 60, Appendix A and 40 CFR 60.4244. The two (2) inlet and two (2) outlet sampling ports shall be located at a minimum of two duct diameters upstream and eight duct diameters downstream of any flow disturbance. The corresponding sampling ports shall be 90 degrees apart from each other. Any variation in sampling port position requires MassDEP approval.
	4. To document actual emissions of the air contaminants listed in Table 2 above, the Permittee shall continuously monitor the following using a data logger connected to a SCADA system, for each engine: a. engine run time in hours through a non-resettable hour meter; and b. biogas consumption rate of each engine (scfm). The Permittee shall install a flow meter on each engine to continuously measure and average over an hourly block basis the biogas consumption rate.
	5. The Permittee shall obtain and record the data required in Condition 4 above using a data logger connected to a SCADA system for at least 90% of the hours per calendar quarter that the subject emission units operate, except for periods of calibration checks, zero and span adjustments, and preventive maintenance.
	6. The Permittee shall monitor the backpressure of the engine systems daily and if there is an elevated backpressure traced to either catalytic oxidizer, the Permittee will determine if catalyst wash or replacement is necessary.
	7. The Permittee shall install test ports at the inlet and outlet of each catalytic oxidizer to accommodate an E Instruments model E1500 (or equivalent) handheld combustion gas analyzer.
	8. The Permittee shall test the catalytic oxidizer efficiency using a properly calibrated E Instruments model E1500 (or equivalent) handheld combustion gas analyzer on a quarterly basis, approximately 90 days apart.
1, 2, and 7	9. If and when MassDEP requires it, the Permittee shall conduct opacity (40 CFR 60 Appendix A, Method 9) and/or smoke observations (40 CFR 60 Appendix A, Method 22) to determine compliance with the visible emission limits stated in Table 2.
2	10. To document actual emissions of the air contaminants listed in Table 2 above, the Permittee shall continuously monitor the following using a data logger connected to a SCADA system: a. flare run time in hours; and b. biogas consumption rate of the flare (scfm). The Permittee shall install a flow meter on the flare to continuously measure and average over an hourly block basis the biogas consumption rate.
	11. The Permittee shall obtain and record the data required in Condition 10 above using a data logger connected to a SCADA system for at least 90% of the hours per calendar quarter that the subject emission unit operates, except for periods of calibration checks, zero and span adjustments, and preventive maintenance.
2	12. The Permittee shall use a thermocouple or any other device approved by the MassDEP to ensure that a flame is present when biogas is being routed to the flare. This monitoring device shall be connected to the SCADA system and include an audible alarm to alert the operator of the absence of a flame while biogas is routed to the back-up flare.

Table 3	
EU	**Monitoring and Testing Requirements**
4	13. The Permittee shall install sampling ports at the inlet and outlet of the DCL America, Inc. (or equivalent) activated carbon filter.
	14. The Permittee shall install new CC-IPH Pelletized Impregnated Carbon Media (or equivalent) when H2S breakthrough has occurred. Breakthrough shall be when the ratio of the H2S concentration in ppm of the gas stream leaving the filter unit to the concentration in the feed is equal to 0.05 to 0.10.
	15. The Permittee shall monitor the DCL America, Inc. (or equivalent) activated carbon filter for breakthrough: a. First cycle – weekly using a sorbent tube or handheld gas analyzer to establish a breakthrough curve at which time the media shall be replaced; b. Second cycle – weekly "sniff tests" shall be conducted until 50% of the expected life cycle has been reached. Then sorbent tube or handheld gas analyzer monitoring to generate a second breakthrough curve shall be conducted weekly; c. After two (2) breakthrough cycles, weekly monitoring can be limited to sniff tests for the first 75% of the expected life cycle, with sorbent tube or handheld gas analyzer monitoring thereafter.
5	16. The Permittee shall at all times that the subject emission unit operates, continuously monitor the temperature and pressure within the anaerobic digester. An exception is made for periods of calibration checks, zero and span adjustments, and preventive maintenance on the monitoring equipment. Monitoring shall be averaged over an hourly block basis.
	17. To document compliance with the emission limitations contained in Table 2 above, the Permittee shall monitor the biogas exiting EU5 using a data logger connected to a SCADA system. The following shall be continuously monitored and averaged over an hourly block basis: a. Methane content (%); b. The maximum, minimum, and average H_2S concentrations (in ppm by volume); c. Oxygen content (%); d. Carbon dioxide concentration (% by volume).
	18. In the event that the H_2S analyzer is offline, the Permittee shall monitor the H_2S concentration (ppm by volume) exiting EU5 using a sorbent tube on a daily basis.
	19. The Permittee shall obtain and record the data required in Conditions 16 and 17 above using a data logger connected to a SCADA system for at least 90% of the hours per calendar quarter that the subject emission unit operates, except for periods of calibration checks, zero and span adjustments, and preventive maintenance.
	20. The Permittee shall install an emergency pressure relief valve to activate if the pressure within EU5 reaches 5 inches of water column. An audible and visual alarm shall alert the operator of the elevated pressure event.
	21. In the event that the emergency pressure relief valve is activated, the Permittee shall verify using audio-visual-olfactory inspection methods that the valve has reseated and is functioning properly. The emergency pressure relief valve shall be thoroughly inspected within 24 hours.
4 and 8	22. The Permittee shall monitor daily the amount and type of SSO that EU4 and EU8 receive.
8	23. The Permittee shall install the following instrumentation on the biofilter to monitor for effectiveness: a. A moisture sensor, and b. Pressure transducers to measure the pressure drop across the biofilter media.

Table 3	
EU	**Monitoring and Testing Requirements**
8	24. The Permittee shall monitor the following biofilter parameters on a weekly basis: a. Moisture level of the biofilter media including confirmation that the biofilter media is uniformly wetted; b. Pressure drop across the biofilter media; and c. The presence of odor by a "sniff test."
	25. For each delivery of glycerin feedstock, the Permittee shall monitor the throughput of glycerin through the glycerin receiving tank.
Facility-wide	26. The Permittee shall conduct a sound survey during daytime and nighttime operations in accordance with a MassDEP-approved protocol. The survey shall be conducted within 60 days of the commencement of continuous operation of EU7.
	27. The Permittee shall work in full cooperation with MassDEP if the sound survey results deviate from the predicted sound levels specified in this Plan Approval. The reason for the deviation shall be investigated and changes shall be implemented to remediate any excess sound being generated. MassDEP shall be notified in advance of any physical changes at the Facility to reduce sound, and of the times any sound measurements will be made to determine the effect of the changes made
	28. The Permittee shall monitor all operations to ensure sufficient information is available to comply with 310 CMR 7.12 Source Registration.
	29. The Permittee shall conduct additional emissions testing on the subject units if and when MassDEP deems it necessary as per 310 CMR 7.13 – Stack Testing. All emissions testing shall be performed in accordance with USEPA Reference Test Methods and regulation 310 CMR 7.13.
	30. In accordance with 310 CMR 7.71(1), the Permittee shall establish and maintain data systems or record keeping practices (e.g. fuel use records, SF_6 usage documentation, Continuous Emissions Monitoring System) for greenhouse gas emissions to ensure compliance with the reporting provisions of M.G.L. c. 21N, the Climate Protection and Green Economy Act, St. 2008, c. 298, § 6. (State Only Requirement)[1].

Table 3 Key:

EU = Emission Unit
CO = Carbon Monoxide
CMR= Code of Massachusetts Regulations
H_2S = Hydrogen Sulfide
NO_x = Nitrogen Oxides
O_2 = oxygen
SCADA = Supervisory Control and Data Acquisition
Total PM = Total Particulate Matter, including filterable PM and condensable PM
ppm = parts per million
SSO = source separated organics (i.e. food waste)
SO_2 = Sulfur Dioxide
VOC = Volatile Organic Compounds
% = percent
scfm = standard cubic feet per minute

Table 3 Notes:

1. Greenhouse Gas means any chemical or physical substance that is emitted into the air and that MassDEP may reasonably anticipate will cause or contribute to climate change including, but not limited to: carbon dioxide (CO_2),

methane (CH_4), nitrous oxide (N_2O), sulfur hexaflouride (SF_6), hydrofluorocarbons (HFCs), and perfluorocarbons (PFCs).

Table 4

EU	Record Keeping Requirements
1 and 7	1. To document actual emissions of the air contaminants listed in Table 2 above, the Permittee shall record, for each engine, the daily, monthly, and twelve month rolling: a. engine run time in hours; and b. biogas consumption (scf).
	2. The Permittee shall, on a quarterly basis, record the measured control efficiency of each catalytic oxidizer (per Table 3, Condition 8).
	3. The Permittee shall keep daily records of the backpressure across the engine system (per Table 3, Condition 6).
	4. The Permittee shall keep records of any catalytic oxidizer washing and/or replacement including but not limited to the date of washing and/or replacement.
2	5. The Permittee shall record the daily, monthly, and twelve month rolling: a. flare run time in hours; b. biogas consumption (scf); and c. any instances of alarm due to the absence of the flame while biogas was being routed to it.
1, 2, and 7	6. The Permittee shall maintain a record keeping system to be established on-site to include compliance records sufficient to document the actual monthly and twelve month rolling emission rates of NO_x, CO, VOC, total PM, SO_2, H_2S, and formaldehyde so as to determine compliance status with the emission limitations contained in Table 2 above.
4	7. The Permittee shall maintain onsite documentation of: a. Weekly records of the "sniff test" results, as applicable; b. Weekly records of the H2S sorbent tube or handheld gas analyzer testing, as applicable, including the results of sorbent tube analysis; c. Weekly records of breakthrough calculation made per Table 3, Condition 15, as applicable; d. Date of activated carbon media replacement; e. Breakthrough curve for DCL America Inc. (or equivalent) activated carbon filter f. Total downtime of the system due to malfunction and/or maintenance delays.
5	8. The Permittee shall, in the event that the SCADA system malfunctions, keep a daily log of the H_2S content of the gas exiting EU5 using a sorbent tube.
	9. The Permittee shall keep records of the addition of ferric chloride or ferric hydroxide H_2S reduction reagents to EU5, including dates, amounts added, and the results in reduction of H_2S in the biogas.
	10. At the outlet of EU5, using the SCADA system, the Permittee shall maintain hourly on-site records of: a. methane content (%) of the biogas; b. the maximum and average one hour hydrogen sulfide concentration (in ppm by volume); c. temperature of the gas stream. d. carbon dioxide concentration (% by volume).

Table 4	
EU	**Record Keeping Requirements**
5	11. The Permittee shall maintain onsite records of any biogas releases to atmosphere including the date, time, location, duration of, and estimated volume (scf) of the release.
	12. In the event that the emergency pressure relief valve is activated, the Permittee shall document/record that the valve was inspected and is functioning properly. Records, at a minimum, shall include: a. Date and time emergency relief valve was activated; b. Operational reason for the activation of the emergency relief valve; c. Date and time of the follow-up inspection; d. Results of inspection including any repairs made; e. Any operational change(s) put in place to avoid a future occurrence.
	13. The Permittee shall record, using the SCADA system, the temperature and pressure within the anaerobic digester, which shall be averaged over an hourly block basis.
4 and 8	14. The Permittee shall record the following: a. Amount and type of material received to the receiving tanks (tons); b. Date and time of material received to the receiving tanks; c. Confirmation that the blower speed was increased during loading operations; d. Confirmation that the driver or operator was trained on proper use of the bio filter system. This information shall be recorded in a logbook, or similar record keeping system, that shall be maintained near EU 4 and 8. Each delivery entry shall be initialed by the driver or operator.
8	15. The Permittee shall record the following biofilter parameters on a weekly basis: a. Moisture level of the biofilter media including confirmation that the biofilter media is uniformly wetted; b. Pressure drop across the biofilter media; c. The presence of odor by a "sniff test;" and d. Any action taken to remediate the biofilter.
Facility-wide	16. The Permittee shall maintain adequate records on-site to demonstrate compliance status with all operational, production, and emission limits contained in Table 2 above. Records shall also include the actual emissions of air contaminant(s) emitted for each calendar month and for each consecutive twelve month period (current month plus prior eleven months). These records shall be compiled no later than the 15th day following each month. An electronic version of the MassDEP approved record keeping form, in Microsoft Excel format, can be downloaded at http://www.mass.gov/dep/air/approvals/aqforms.htm#report .
	17. The Permittee shall quantify and record all periods of excess emissions, even if attributable to an emergency/malfunction, startup/shutdown or equipment cleaning in the determination of annual emissions and compliance with the emission limits as stated in Table 2.

Table 4	
EU	**Record Keeping Requirements**
Facility-wide	18. The Permittee shall maintain a record keeping system for these EUs to be established on-site. Recordkeeping shall, at a minimum, include: a. Compliance records sufficient to document that the actual monthly and twelve month rolling emission rates of NO_x, CO, VOC, total PM, SO_2, H_2S, and formaldehyde from each EU are in compliance with the emission limitations contained in Table 2 above. Such records shall include, but are not limited to, the daily, monthly, and twelve month rolling biogas consumption rates for each applicable EU, emissions test results, monitoring equipment data and reports, and hours of operation. b. Maintenance: A record of routine maintenance activities performed on these EUs and their monitoring equipment including, at a minimum, the type or a description of the maintenance performed and the date and time the work was completed. c. Malfunctions: A record of all malfunctions of these EUs, their monitoring equipment, and the SCADA system including, at a minimum: the date and time the malfunction occurred; a description of the malfunction and the corrective action taken; the date and time corrective actions were initiated; and the date and time corrective actions were completed and the equipment was returned to compliance.
	19. The Permittee shall maintain records of monitoring and testing as required by Table 3.
	20. The Permittee shall maintain a copy of all sound survey results on-site.
	21. The Permittee shall keep a log of any noise and/or odor complaints received by the Facility documenting the date/time, name/contact information of the person making the complaint (if given), nature of the complaint, possible cause, and resolution.
	22. The Permittee shall maintain a copy of this Plan Approval, underlying Application and the most up-to-date SOMP for the EUs and PCDs approved herein on-site.
	23. The Permittee shall maintain records required by this Plan Approval on-site for a minimum of five (5) years.
	24. The Permittee shall make records required by this Plan Approval available to MassDEP and USEPA personnel upon request.
	25. The Permittee shall maintain records to ensure sufficient information is available to comply with 310 CMR 7.12 Source Registration.
	26. In accordance with 310 CMR 7.71 (6) (b) and (c), the Permittee shall keep onsite at the facility documents of the methodology and data used to quantify GHG emissions for a period of 5 years from the date the document is created. The Permittee shall make these documents available to MassDEP upon request. (State Only Requirement).

Table 4 Key:

EU = Emission Unit

CO = Carbon Monoxide

GHG = Greenhouse Gases

Total PM = Total Particulate Matter, including filterable PM and condensable PM

SCADA = Supervisory Control and Data Acquisition

scf = standard cubic feet

H_2S = Hydrogen Sulfide
NO_x = Nitrogen Oxides
PCD = Pollution Control Device
% = percent
SO_2 = Sulfur Dioxide
SOMP = Standard Operating and Maintenance Procedure
SSO = source separated organics
USEPA = United States Environmental Protection Agency
VOC = Volatile Organic Compounds

Table 5

EU	Reporting Requirements
1 and 7	1. The Permittee shall submit a compliance emission test protocol to MassDEP's Central Regional Office for review and approval at least 30 days prior to the scheduled commencement of said testing.
	2. The Permittee shall submit an emission test report to MassDEP's Central Regional Office for review within 60 days of the completion of any required compliance stack testing.
	3. The Permittee shall notify MassDEP whenever EU1 and/or EU7 is rebuilt or undergoes major repair or maintenance as defined in 40 CFR 94.11(a) within 30 days of the rebuild, major repair or maintenance.
Facility-wide	4. The Permittee shall submit a sound survey protocol for the required initial compliance test to MassDEP's Central Regional Office for review and approval at least 30 days prior to the scheduled commencement of said survey.
	5. The Permittee shall submit the sound survey results to MassDEP's Central Regional Office, in writing, attention BAW Permit Chief, within 45 days of completion of the sound survey.
	6. The Permittee shall notify MassDEP's Central Regional Office, in writing, within 14 days of commencement of continuous operation of EU7 and EU8.
	7. The Permittee shall submit to MassDEP's Central Regional Office all information required by this Plan Approval over the signature of a "Responsible Official" as defined in 310 CMR 7.00 and shall include the Certification statement as provided in 310 CMR 7.01(2)(c).
	8. The Permittee shall notify the Central Regional Office of MassDEP, BAW Permit Chief by telephone: 508-767-2845, email: CERO.Air@massmail.state.ma.us and Roseanna.Stanley@state.ma.us, or fax : 508-792-7621, as soon as possible, but no later than three (3) business days after discovery of an exceedance(s) of Table 2 requirements. A written report shall be submitted to Permit Chief at MassDEP within ten (10) business days thereafter and shall include: identification of exceedance(s), duration of exceedance(s), reason for the exceedance(s), corrective actions taken, and action plan to prevent future exceedance(s).
	9. The Permittee shall provide a copy to MassDEP of any record required to be maintained by this Plan Approval within 30-days from MassDEP's written request.

Table 5	
EU	**Reporting Requirements**
	10. The Permittee shall report every three years to MassDEP, in accordance with 310 CMR 7.12, all information as required by the Source Registration/Emission Statement Form. Pursuant to 7.12(3)(a)2., the Permittee shall report detailed emission estimates for all criteria and hazardous pollutants emitted at the Facility
Facility-wide	11. In accordance with 310 CMR 7.71(5)(a)2., the Permittee shall report and certify direct emissions of greenhouse gases for the previous calendar year in accordance with 310 CMR 7.71(5) through (7). (State Only Requirement).

Table 5 Key:

EU = Emission Unit
H_2S = hydrogen sulfide
BAW = Bureau of Air and Waste
SOMP = Standard Operating and Maintenance Procedure

4. SPECIAL TERMS AND CONDITIONS

A. The Permittee is subject to, and shall comply with, the Special Terms and Conditions as contained in Table 6 below:

Table 6	
EU	**Special Terms and Conditions**
1	1. The Permittee shall, within 30 days of the commencement of continuous operation of EU7, install on EU1 an oxidation catalyst capable of controlling carbon monoxide emissions by a minimum of 95% and formaldehyde emissions by a minimum of 85%. The oxidation catalyst shall operate at all times that EU1 is operating.
	2. After the oxidation catalyst is installed, the Permittee shall establish, through Table 3 monitoring and/or stack testing, the outlet CO concentration that corresponds to the Table 2 limit of 0.13 g/bhp-hr, and shall use that concentration as a benchmark. The Permittee shall replace the oxidation catalyst within 10 business days if the outlet CO concentration determined through Table 3 monitoring rises above 95% of the benchmark CO concentration.
	3. The Permittee shall, within 30 days of the commencement of continuous operation of EU7, upgrade the silencer on EU1 to a Super Extreme Grade Model #A201-7100 silencer manufactured by GT Exhaust (or equivalent).

Table 6

EU	Special Terms and Conditions
1	4. The Permittee shall house EU1 in a prefabricated, acoustically-treated enclosure designed for sound mitigation. The Permittee shall ensure that the enclosure has a sound attenuating enclosure installed on the outlet ventilation louvers.
	5. The Permittee shall meet the EU1 and Facility-wide CO emission limits established in Plan Approval Transmittal No. X256969 until EU7 is operational and the oxidation catalyst described in Condition 1 above is installed on EU1. Thereafter, the Permittee shall meet all CO emission limits in Table 2.
2	6. The Permittee shall design the back-up flare (positioning, etc.) and/or otherwise equip the flare to provide protection to raptors. Specifications shall be included in the facility's SOMP document (Condition 22 below).
	7. The Permittee shall install emergency backup power generation capable of powering the flare system if deemed by MassDEP that this is necessary.
	8. The Permittee shall operate and maintain the flare in accordance with the manufacturer's recommendations and in a manner consistent with good air pollution control practice for minimizing emissions.
4	9. The Permittee shall keep replacement CC-IPH Pelletized Impregnated Carbon Media activated carbon (or equivalent) onsite at all times to ensure continuous odor control of the hydrolyzer tank.
	10. The Permittee shall develop a SOMP for the DCL America Inc. (or equivalent) activated carbon system within 60 days of installation and maintain the SOMP onsite.
5	11. The Permittee shall install, properly operate and maintain the hydrogen sulfide (H_2S) control system in the digester according to the SOMP developed by the Permittee for the purpose of maintaining the H_2S concentration below 200 parts per million by volume (ppmv) as a daily average prior to the combustion of the biogas in EU1, EU2, or EU7. The H_2S control system includes the aerobic mesh in the biogas headspace and the addition of iron compound reagents to the digester.
	12. The Permittee shall be allowed to ramp up the digester in preparation for installing EU7 and the associated increased use of the flare during that time.
	13. The Permittee shall install enclosures or sound reflectors on the three digester mixers, and the two membrane roof pressure fans within 120 days of the issuance of this Plan Approval.
7	14. The Permittee shall install on EU7 an oxidation catalyst capable of controlling carbon monoxide emissions by a minimum of 95% and formaldehyde emissions by a minimum of 85%. The oxidation catalyst shall operate at all times that EU7 is operating.
	15. The Permittee shall establish, through Table 3 monitoring and/or stack testing, the outlet CO concentration that corresponds to the Table 2 limit of 0.13 g/bhp-hr, and shall use that concentration as a benchmark. The Permittee shall replace the oxidation catalyst within 10 business days if the outlet CO concentration determined through Table 3 monitoring rises above 95% of the benchmark CO concentration.

Table 6

EU	Special Terms and Conditions
7	16. The Permittee shall install a Super Extreme Grade Model #A201-8100 silencer manufactured by GT Exhaust (or equivalent) upon installation of EU7.
	17. The Permittee shall house EU7 in a prefabricated, acoustically-treated enclosure designed for sound mitigation. The Permittee shall ensure that the building enclosure air inlet and exhaust are fitted with acoustic louvers.
1 and 7	18. The Permittee shall operate and maintain EU1 and EU7 to achieve the emission standards as required in Table 2 over the entire life of the engines.
	19. The Permittee shall maintain EU1 and EU7 in accordance with the manufacturer's recommendations and must, to the extent practicable, maintain and operate the engines in a manner consistent with good air pollution control practice for minimizing emissions.
	20. The Permittee shall use only digester (EU5) biogas as fuel in EU1 and 7.
	21. In the event that EU1 and/or EU7 is rebuilt or undergoes major repair or maintenance as defined in 40 CFR 94.11(a), the Permittee shall conduct subsequent performance testing as detailed in Table 3 in order to verify continued compliance with the Table 2 emission limits, and shall submit the emission test protocol and emission test report as detailed in Table 5, Conditions 1 and 2.
	22. The Permittee shall contract the maintenance and servicing of the CHP engine to ensure that a full inventory of spare parts for the CHP engine shall be kept onsite or at an offsite location for use within two hours of the facility.
1, 2, 5, and 7	23. The Permittee shall develop a SOMP for the CHP engines, digester, and flare systems within 90 days of startup of EU7. The Permittee shall operate the EUs consistent with the Final SOMP and the conditions/parameters established during the initial compliance test. The final SOMP shall include operating procedures for periods of start-up and shut-down. The Permittee shall maintain the SOMP onsite.
1, 5, and 7	24. The Permittee shall install the following noise mitigation equipment: a. EU1 engine will be retrofitted with a Super Extreme Grade Silencer manufactured by GT Exhaust (or equivalent) to reduce exhaust sound levels. b. The new CHP engine (EU7) will be delivered in a prefabricated acoustically-treated enclosure which will have acoustically-treated inlet and outlet exhaust louvers. The engine will have a Super Extreme Grade Silencer manufactured by GT Exhaust (or equivalent) to reduce exhaust sound levels. c. The EU1 engine enclosure will have a sound attenuating enclosure installed on the outlet ventilation louvers. d. The EU5 digester will have sound attenuated enclosures installed on the low, medium, and high height mixers and the two membrane roof pressure fans.
8	25. The Permittee shall install a biofilter to the custom specifications given during the application process to control odor from the three SSO receiving tanks. The Permittee may request changes to the biofilter and implement the changes with MassDEP approval.

Table 6	
EU	**Special Terms and Conditions**
8	26. The Permittee shall ensure that the odor control blower fan has increased in speed before adding liquid or solid SSO during any tank filling activities.
	27. The Permittee shall install, properly operate and maintain the biofilter according to the SOMP developed by the Permittee for the purpose of controlling odors from EU8.
	28. The Permittee shall train Facility personnel in the proper operation of the blower system during unloading operations and shall ensure that the blower fan is running at the design flow of the biofilter system at all times. Records shall be kept that include, but are not limited to, the name of the person trained and the date of training.
	29. The Permittee shall keep the lid on each tank closed between unloading operations and shall minimize the time that the tanks lids are opened during unloading operations.
Facility-wide	30. The Permittee shall keep a full inventory of spare parts, as listed in the SOMPs, for the entire anaerobic digestion facility onsite or at an offsite location within two hours travel time of the facility.
	31. Compliance with the conditions of this Plan Approval does not relieve the Permittee from the obligation to comply with 310 CMR 7.01 and 310 CMR 7.10 when operating the approved project/equipment or any other activities at the Facility
	32. The Permittee shall notify MassDEP of any complaints received relative to noise from the Facility no later than three (3) business days after the complaint is received, documenting the date/time, name/contact information of the person making the complaint (if given), nature of the complaint, possible cause, and resolution.
	33. In the case of noise complaints against the Facility, the Permittee shall take whatever actions are deemed necessary by MassDEP to mitigate noise.
	34. This Plan Approval Transmittal No. X274161-A1 supersedes the Plan Approval Transmittal No. X269335 issued to the Permittee on December 12, 2016. The underlying Plan Application materials for Transmittal No. X269335 remain in effect where not superseded by this Plan Approval Transmittal No. X274161-A1.

Table 6 Key:

EU = Emission Unit
BAW = Bureau of Air and Waste
CO = Carbon Monoxide
SSO = Source Separated Organics
g/bhp-hr = grams per brake-horse-power hour
H_2S = Hydrogen Sulfide
% = percent
SOMP = Standard Operating and Maintenance Procedure
CHP = Combined Heat and Power

B. The Permittee shall install and use an exhaust stack, as required in Table 7, on each of the Emission Units that is consistent with good air pollution control engineering practice and that discharges so as to not cause or contribute to a condition of air pollution. Each exhaust stack

shall be configured to discharge the gases vertically and shall not be equipped with any part or device that restricts the vertical exhaust flow of the emitted gases, including, but not limited to, rain protection devices known as "shanty caps" and "egg beaters."

C. The Permittee shall install and utilize exhaust stacks with the following parameters, as contained in Table 7, for the Emission Units that are regulated by this Plan Approval:

Table 7

EU	Stack Height Above Ground (feet)	Stack Inside Exit Dimensions (feet)	Stack Gas Exit Velocity (feet per second)	Stack Gas Exit Temperature (°F)
1	34	0.75	~ 73	~ 268
2	20	2.06	~ 40	~ 1832
7	27	0.75	~ 49	~ 290

Table 7 Key:

EU = Emission Unit Number
°F = Degree Fahrenheit
~ = approximate

5. GENERAL CONDITIONS

The Permittee is subject to, and shall comply with, the following general conditions:

A. Pursuant to 310 CMR 7.01, 7.02, 7.09 and 7.10, should any nuisance condition(s), including but not limited to smoke, dust, odor or noise, occur as the result of the operation of the Facility, then the Permittee shall immediately take appropriate steps including shutdown, if necessary, to abate said nuisance condition(s).

B. If asbestos remediation/removal will occur as a result of the approved construction, reconstruction, or alteration of this Facility, the Permittee shall ensure that all removal/remediation of asbestos shall be done in accordance with 310 CMR 7.15 in its entirety and 310 CMR 4.00.

C. If construction or demolition of an industrial, commercial or institutional building will occur as a result of the approved construction, reconstruction, or alteration of this Facility, the Permittee shall ensure that said construction or demolition shall be done in accordance with 310 CMR 7.09(2) and 310 CMR 4.00.

D. Pursuant to 310 CMR 7.01(2)(b) and 7.02(7)(b), the Permittee shall allow MassDEP and/or USEPA personnel access to the Facility, buildings, and all pertinent records for the purpose of making inspections and surveys, collecting samples, obtaining data, and reviewing records.

E. This Plan Approval does not negate the responsibility of the Permittee to comply with any other applicable Federal, State, or local laws or regulations now or in the future.

F. The Application is incorporated into this Plan Approval by reference. Should there be any differences between the Application and this Plan Approval, the Plan Approval shall govern.

G. Pursuant to 310 CMR 7.02(3)(k), MassDEP may revoke this Plan Approval if the construction work is not commenced within two years from the date of issuance of this Plan Approval, or if the construction work is suspended for one year or more.

H. This Plan Approval may be suspended, modified, or revoked by MassDEP if MassDEP determines that any condition or part of this Plan Approval is being violated.

I. This Plan Approval may be modified or amended when in the opinion of MassDEP such is necessary or appropriate to clarify the Plan Approval conditions or after consideration of a written request by the Permittee to amend the Plan Approval conditions.

J. Pursuant to 310 CMR 7.01(3) and 7.02(3)(f), the Permittee shall comply with all conditions contained in this Plan Approval. Should there be any differences between provisions contained in the General Conditions and provisions contained elsewhere in the Plan Approval, the latter shall govern.

6. MASSACHUSETTS ENVIRONMENTAL POLICY ACT

MassDEP has determined that the filing of an Environmental Notification Form (ENF) with the Secretary of Energy & Environmental Affairs, for air quality control purposes, was not required prior to this action by MassDEP. Notwithstanding this determination, the Massachusetts Environmental Policy Act (MEPA) and 301 CMR 11.00, Section 11.04, provide certain "Fail-Safe Provisions," which allow the Secretary to require the filing of an ENF and/or an Environmental Impact Report (EIR) at a later time.

7. APPEAL PROCESS

This Plan Approval is an action of MassDEP. If you are aggrieved by this action, you may request an adjudicatory hearing. A request for a hearing must be made in writing and postmarked within twenty-one (21) days of the date of issuance of this Plan Approval.

Under 310 CMR 1.01(6)(b), the request must state clearly and concisely the facts, which are the grounds for the request, and the relief sought. Additionally, the request must state why the Plan Approval is not consistent with applicable laws and regulations.

The hearing request along with a valid check payable to the Commonwealth of Massachusetts in the amount of one hundred dollars ($100.00) and a completed Adjudicatory Hearing Fee Transmittal Form, a copy of which is attached hereto, must be mailed to:

Commonwealth of Massachusetts
Department of Environmental Protection
P.O. Box 4062
Boston, MA 02211

This request will be dismissed if the filing fee is not paid, unless the appellant is exempt or granted a waiver as described below. The filing fee is not required if the appellant is a city or town (or municipal agency), county, or district of the Commonwealth of Massachusetts, or a municipal housing authority.

MassDEP may waive the adjudicatory hearing filing fee for a person who shows that paying the fee will create an undue financial hardship. A person seeking a waiver must file, together with the hearing request as provided above, an affidavit setting forth the facts believed to support the claim of undue financial hardship.

Enclosed is a stamped approved copy of the application submittal.

Should you have any questions concerning this Plan Approval, please contact Paul Dwiggins by telephone at 508-767-2760, or in writing at the letterhead address.

This final document copy is being provided to you electronically by the Department of Environmental Protection. A signed copy of this document is on file at the DEP office listed on the letterhead.

Roseanna E. Stanley
Permit Chief
Bureau of Air and Waste

Enclosures:
- Adjudicatory Hearing Fee Transmittal Form
- Stamped Plan Application

ecc: Rutland Board of Health
Rutland Fire Department
MassDEP/Boston - Yi Tian
Tech Environmental